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Introduction

- The Kirtland's warbler (*Setophaga kirtlandii*), a Federally endangered ground-nesting songbird, relies on young dense stands of jack pine (*Pinus banksiana*) in Michigan, USA for breeding.
- With management efforts, the population has stabilized at a level that is approximately twice the recovery goal.
- A small breeding population has established in Wisconsin, in a habitat type that differs compositionally from that typically occupied in Michigan.

Goal

To characterize habitat used, identify predators, and to quantify fledgling habitat use in Wisconsin.

Data and Methods

Study site

The study site is located in Adams County, Wisconsin on commercial forestry land dominated by red pine (*Pinus resinosa*). Brown-headed cowbird (*Molothrus ater*) trapping occurs at the site to reduce nest parasitism.

Data

- Preliminary vegetation data collected at 12 nest sites and 12 control sites in 2015
- Nest fates were documented by WI Department of Natural Resources/U.S. Fish and Wildlife Service in 2015

Methods

- The numbers of males, male territories, and breeding activities were documented.
- Once nests were inactive, vegetation measurements were collected at nest sites and paired control plots
- Vegetation data include:
 - Microsite: vegetation height, density, ground cover, litter depth
 - Nest concealment, height of lowest live branch
 - Tree species and height
- In 2016 and 2017 nest predation will be determined using continuously recording cameras and post-fledging habitat use will be assessed using radio-tracking

Results: Ground Cover

Compared to random sites within 50m, in 1x1m plots nests had:

- Greater litter depth ($p=0.002$)
- Greater percentage of litter ($p=0.02$)
- Lower percentage of bare ground ($p=0.01$)
- More branches in plot ($p=0.007$)
- Trend toward shorter height of lowest live branch ($p=0.09$)



Kirtland's Warbler Nest Site; arrow points at nest located on the ground © Ashley Hannah 2014

Results: Stand Composition

From nest and random plots:

- Average tree density of occupied stands was 2,443 trees/hectare
- Occupied stands were made up of 44.5% red pine, 10.5% jack pine, and 38.2% black/northern pin oak (*Quercus velutina* and *Q. Ellipsoidalis*)
- Tree composition is similar to that reported in WI in 2009, but percentage of red pine and jack pine is lower, and percentage of oak is higher (**fig. 1**)
- Tree density, height, and species composition was not different among control plots and nest plots

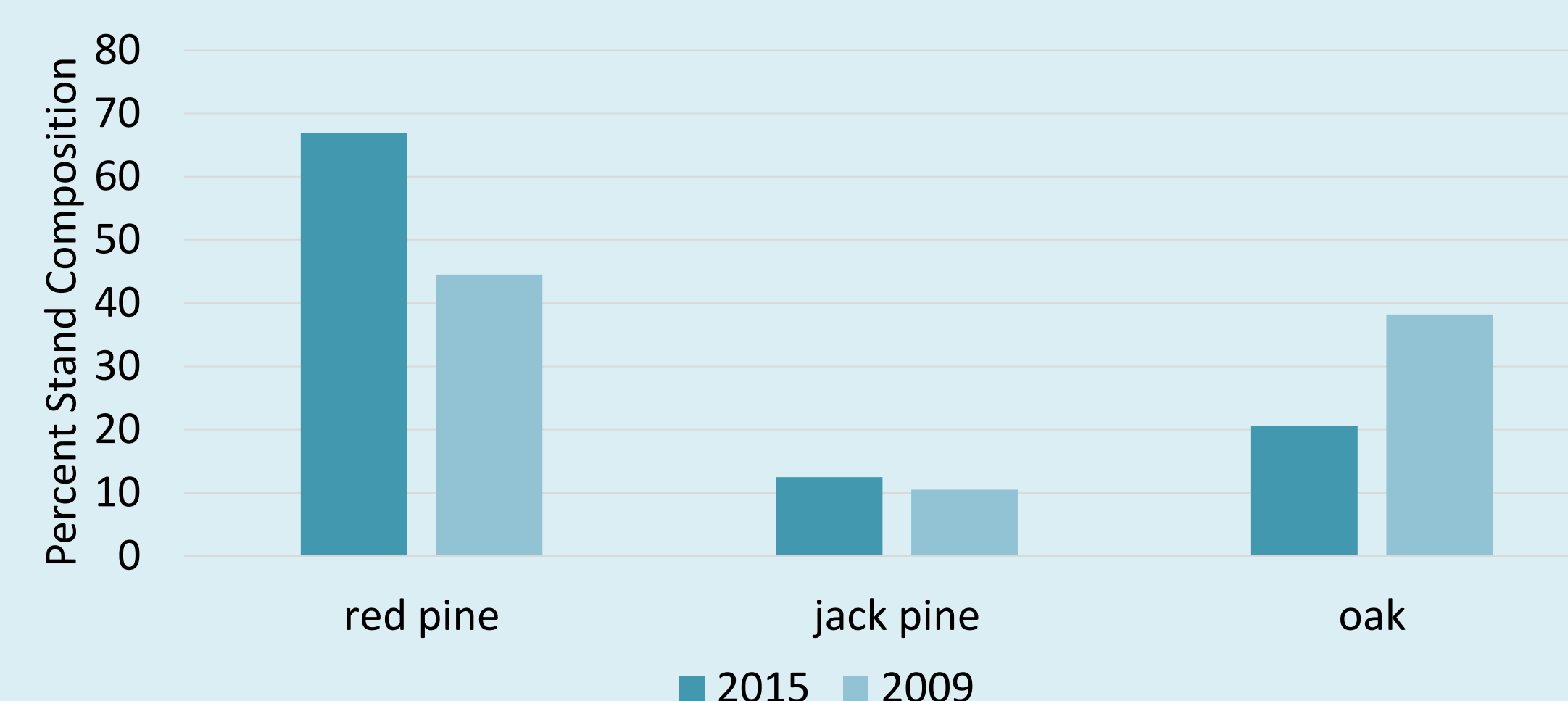


Fig. 1 Comparison of percent composition of red pine dominated stands occupied in Adams County by Kirtland's Warblers in 2009 and 2015.

Results: Birds

- In 2015, 15 males were documented in Adams County
 - 14 males were paired
 - 1 pair was not documented nesting
- 15 nests were initiated
 - 3 nests failed before chicks fledged
 - In 12 nests chicks fledged successfully
 - 1 nest was parasitized by cowbirds but 3 Kirtland's warbler chicks fledged
- In total 34-51 chicks fledged



Male Kirtland's Warbler © Ashley Hannah 2015

- One nest camera was deployed in 2015; the nest was not predated and 5 young fledged
- 363 (229 males, 134 females) brown-headed cowbirds were trapped and removed in 2015

Discussion and Conclusions

- Ground cover attributes are most likely related to nest concealment. Litter depth has been found to be important for grassland bird species.
- Height of lowest live branch and number of branches <50cm in height near the nest may also be important for nest concealment.
- Total tree density of occupied stands is similar to that reported from nearby stand occupied in 2009 (and which is no longer occupied).
- Average tree density of occupied stands is similar to that reported for stands occupied in Michigan where jack pine plantations have densities of approximately 2,000 stems per hectare, and wildfire regenerated stands can achieve stem densities of 8,000 stems per hectare or more.

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